REMARKS

Claims 1 and 4-7 were pending in the application. Claims 1 and 4-7 are being amended. Claim 9 is being added. The language of claim 9 is based on claim 1 as originally filed.

All outstanding requirements made in the Office Action mailed January 25, 2008.will now be addressed.

Claim Objections

3 - 8. Claims 1 and 5 stand objected to because of informalities cited in the Office Action. The Applicants have amended claims 1 and 5 as suggested by the Examiner. Withdrawal of the objection is respectfully requested.

Specification Objection - § 35 USC 132(a) and Claim Rejections - 35 USC § 112

2 and **9 - 10**. The amendment to specification filed November 7, 2007 stands objected to under 35 U.S.C. 132(a) because it allegedly introduces new matter into the disclosure and the added material is not supported by the original disclosure. The added material which is allegedly not supported by the original disclosure is as follows: enabling identification of the CPE interface "by MAC addressees" and "receiving the input buffer" para. [0009]. The Office Action requires cancellation of the alleged new matter in the reply to this Office Action. In addition, claims 6 and 7 are rejected under 35 U.S.C. 112, first paragraph as failing to comply with the written description because the claims allegedly contain subject matter which was not described in the specification.

Applicants respectfully disagree and submit the following arguments. The Examiner states that the specification does not disclose how to reserve the input buffer and/or questions whether reserving the input buffer results in a reservation. However, the specification discloses in paragraph [0023] that a buffer is a memory chunk, which is reserved and released by the multiplexer apparatus. Applicants respectfully submit that reserving a section

of memory for buffering purposes is well known in the art for many years and is common general knowledge. Specifically, the Examiner is directed to the following resources provided in the appendices: http://en.wikipedia.org/wiki/Data_buffer (Appendix A) and http://en.wikipedia.org/wiki/Memory (Appendix B).

Specifically, in computing, a buffer refers to a region of memory used to temporarily hold data while it is being moved from one place to another. Typically, data is stored in a buffer as it is retrieved from an input device (such as a keyboard) or just before it is sent to an output device (such as a printer). Moreover a section of memory has to be allocated before it can be used as a buffer. Memory allocation and release are basic computer techniques. Therefore, there is sufficient clarity in the art of how to reserve/release memory for the input buffer.

11-13. Claims 1 and 4-7 are rejected under 35 USC 112, second paragraph, as being indefinite for allegedly failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In addition, there is also insufficient antecedent basis for certain limitations in claims 1 and 5-7. Applicants have made appropriate corrections to obviate the Examiner's rejections. Withdrawal of the rejections is respectfully requested with respect to the claims as amended.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants submit that the pending claims are in condition for allowance. Early and favorable reconsideration is respectfully solicited. No authorization to charge deposit account is given and any prior outstanding authorizations are hereby rescinded. Any fees dues will be remitted via EFS-Web until further notice.

Respectfully Submitted,

Customer Number: **33,794**

/Matthias Scholl/

Dr. Matthias Scholl, Esq.
Reg. No. 54,947
Attorney of Record

Date: April 25, 2008

http://en.wikipedia.org/wiki/Data_buffer

Data buffer

From Wikipedia, the free encyclopedia

In computing, a **buffer** is a region of memory used to temporarily hold data while it is being moved from one place to another. Typically, the data is stored in a buffer as it is retrieved from an input device (such as a keyboard) or just before it is sent to an output device (such as a printer). However, a buffer may be used when moving data between processes within a computer. This is comparable to buffers in telecommunication. Buffers can be implemented in either hardware or software, but the vast majority of buffers are implemented in software. Buffers are typically used when there is a difference between the rate at which data is received and the rate at which it can be processed, or in the case that these rates are variable, for example in a printer spooler.

Contents

Applications

Buffers are often used in conjunction with I/O to hardware, such as disk drives, sending or receiving data to or from a network, or playing sound on a speaker. A line to a rollercoaster in an amusement park shares many similarities. People who ride the coaster come in at an unknown and often variable pace, but the roller coaster will be able to load people in bursts (as a coaster arrives and is loaded). The line to the ride acts as a buffer: a temporary space where those wishing to ride wait until the ride is available. Buffers are usually used in a FIFO (first in, first out) method, outputting data in the order it came in.

Types

- Circular buffers

Buffer versus cache

Further information:
Cache#The_difference_between_buffer_and_cache

A cache acts often also as a buffer, and vice versa. However, cache operates on the premise that the same datum will be read from it multiple times, that written data will soon be read, or that there is a good chance of multiple reads or writes to combine to form a single larger block. Its sole purpose is to reduce accesses to the underlying slower storage. Cache is also usually an abstraction layer that is designed to be invisible.

See also

- Buffer (telecommunication)
- Buffer overflow
- Buffer underrun
- Circular buffer
- Cache
- Streaming media
- Frame buffer for use in graphical display
- Double buffering and Triple buffering for techniques mainly in graphics
- Pixel buffer, Color buffer, Depth buffer, Stencil buffer, Accumulation buffer for different parts of image information

Retrieved from "http://en.wikipedia.org/wiki/Data_buffer"
Categories: Computer memory

APPENDIX 1

http://en.wikipedia.org/wiki/Data_buffer

Memory

From Wikipedia, the free encyclopedia

In psychology, **memory** is an organism's ability to store, retain, and subsequently retrieve information. Traditional studies of memory began in the realms of philosophy, including techniques of artificially enhancing the memory.

The late nineteenth and early twentieth century put memory within the paradigms of cognitive psychology. In recent decades, it has become one of the principal pillars of a branch of science called cognitive neuroscience, an interdisciplinary link between cognitive psychology and neuroscience.

Contents

Neuropsychology

Topics

Brain-computer interfaces • Traumatic Brain Injury
Brain regions • Clinical neuropsychology
Cognitive neuroscience • Human brain
Neuroanatomy • Neurophysiology
Phrenology • Common misconceptions

Brain functions

arousal • attention
consciousness • decision making
executive functions • language
learning • **memory**
motor coordination • sensory perception
planning • problem solving
thought

People

Arthur L. Benton • David Bohm •
António Damásio • Kenneth Heilman •
Phineas Gage • Norman Geschwind •
Elkhonon Goldberg • Donald Hebb •
Alexander Luria • Muriel D. Lezak •
Brenda Milner • Karl Pribram •
Oliver Sacks •
Rodolfo Llinas • Roger Sperry• H.M.• K.C.

Tests

Bender-Gestalt Test
Benton Visual Retention Test
Clinical Dementia Rating
Continuous Performance Task
Glasgow Coma Scale
Hayling and Brixton tests
Lexical decision task
Mini-mental state examination
Stroop effect
Wechsler Adult Intelligence Scale
Wisconsin card sorting task

Tools

Johari Window

Mind and Brain Portal

Processes

There are several ways to classify memories, based on duration, nature and retrieval of information. From an information processing perspective there are three main stages in the formation and retrieval of memory:

- *Encoding* or registration (processing and combining of received information)
- *Storage* (creation of a permanent record of the encoded information)
- *Retrieval* or *recall* (calling back the stored information in response to some cue for use in a process or activity)

Classification

A basic and generally accepted classification of memory is based on the duration of memory retention, and identifies three distinct types of memory: sensory memory, short term memory and long term memory.

Sensory

Sensory memory corresponds approximately to the initial 200 - 500 milliseconds after an item is perceived. The ability to look at an item, and remember what it looked like with just a second of observation, or memorization, is an example of sensory memory. With very short presentations, participants often report that they seem to "see" more than they can actually report. The first experiments exploring this form of sensory memory were conducted by George Sperling using the "partial report paradigm." Subjects were presented with a grid of 12 letters, arranged into three rows of 4. After a brief presentation, subjects were then played either a high, medium or low tone, cuing them which of the rows to report. Based on these partial report experiments, Sperling was able to show that the capacity of sensory memory was approximately 12 items, but that it degraded very quickly (within a few hundred milliseconds). Because this form of memory degrades so quickly, participants would see the display, but be unable to report all of the items (12 in the "whole report" procedure) before they decayed. This type of memory cannot be prolonged via rehearsal.

Short-term

Some of the information in sensory memory is then transferred to short-term memory. Short-term memory allows one to recall something from several seconds to as long as a minute without rehearsal. Its capacity is also very limited: George A. Miller, when working at Bell Laboratories, conducted experiments showing that the store of short term memory was 7±2 items (the title of his famous paper, "The magical number 7±2"). Modern estimates of the capacity of short-term memory are lower, typically on the order of 4-5 items, and we know that memory capacity can be increased through a process called chunking. For example, if presented with the string:

FBIPHDTWAIBM

people are able to remember only a few items. However, if the same information is presented in the following way:

FBI PHD TWA IBM

people can remember a great deal more letters. This is because they are able to chunk the information into meaningful groups of letters. Beyond finding meaning in the abbreviations above, Herbert Simon showed that the ideal size for chunking letters and numbers, meaningful or not, was three. This may be reflected in some countries in the tendency to remember phone numbers as several chunks of three

numbers with the final four-number groups generally broken down into two groups of two.

Short-term memory is believed to rely mostly on an acoustic code for storing information, and to a lesser extent a visual code. Conrad (1964)[1] found that test subjects had more difficulty recalling collections of words that were acoustically similar (e.g. dog, hog, fog, bog, log).

Long-term

The storage in sensory memory and short-term memory generally have a strictly limited capacity and duration, which means that information is available for a certain period of time, but is not retained indefinitely. By contrast, long-term memory can store much larger quantities of information for potentially unlimited duration (sometimes a whole life span). For example, given a random seven-digit number, we may remember it for only a few seconds before forgetting, suggesting it was stored in our short-term memory. On the other hand, we can remember telephone numbers for many years through repetition; this information is said to be stored in long-term memory. While short-term memory encodes information acoustically, long-term memory encodes it semantically: Baddeley (1966)[2] discovered that after 20 minutes, test subjects had the greatest difficulty recalling a collection of words that had similar meanings (e.g. big, large, great, huge).

Short-term memory is supported by transient patterns of neuronal communication, dependent on regions of the frontal lobe (especially dorsolateral prefrontal cortex) and the parietal lobe. Long-term memories, on the other hand, are maintained by more stable and permanent changes in neural connections widely spread throughout the brain. The hippocampus is essential to the consolidation of information from short-term to long-term memory, although it does not seem to store information itself. Rather, it may be involved in changing neural connections for a period of three months or more after the initial learning.

One of the primary functions of sleep is improving consolidation of information, as it can be shown that memory depends on getting sufficient sleep between training and test, and that the hippocampus replays activity from the current day while sleeping.

Musical Memory

Musical memory refers to the ability to listen to a song and be able to remember all of the different parts the song (vocals, guitar, drums...) and combine them together to reform the song inside your head.

Models

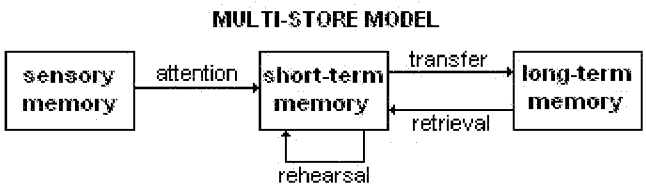
Models of memory provide abstract representations of how memory is believed to work. Below are several models proposed over the years by various psychologists. Note that there is some controversy as to whether there are several memory structures, for example, Tarnow (2005) finds that it is likely that there is only one memory structure between 6 and 600 seconds.

Multi-store (Atkinson-Shiffrin memory model)

The multi-store model (also known as Atkinson-Shiffrin memory model) was first recognised in 1968 by Atkinson and Shiffrin.

The multi-store model has been criticized for being too simplistic. For instance, long-term memory is

believed to be actually made up of multiple subcomponents, such as episodic and procedural memory. It also proposes that rehearsal is the only mechanism by which information eventually reaches long-term storage, but evidence shows us capable of remembering things without rehearsal.

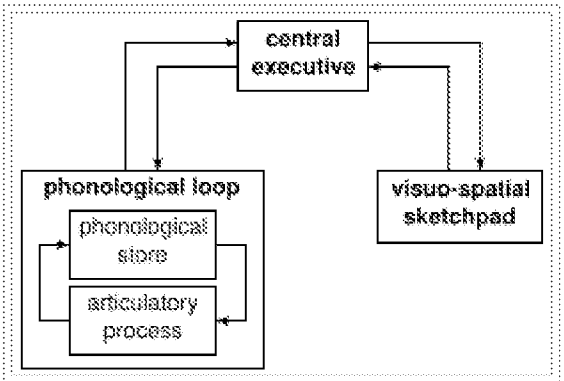


(See also: Memory consolidation)

Working memory

In 1974 Baddeley and Hitch proposed a **working memory model** which replaced the concept of general short term memory with specific, active components. In this model, working memory consists of three basic stores: the central executive, the phonological loop and the visuo-spatial sketchpad. In 2000 this model was expanded with the multimodal episodic buffer.[3]

The central executive essentially acts as attention. It channels information to the three component processes: the phonological loop, the visuo-spatial sketchpad, and the episodic buffer.



The working memory model.

The phonological loop stores auditory information by silently rehearsing sounds or words in a continuous loop; the articulatory process (the "inner voice") continuously "speaks" the words to the phonological store (the "inner ear"). The phonological loop has a very limited capacity, which is demonstrated by the fact that it is easier to remember a list of short words (e.g. dog, wish, love) than a list of long words (e.g. association, systematic, confabulate) because short words fit better in the loop. However, if the test subject is given a task that ties up the articulatory process (saying "the, the, the" over and over again), then a list of short words is no easier to remember.

The visuo-spatial sketchpad stores visual and spatial information. It is engaged when performing spatial tasks (such as judging distances) or visual ones (such as counting the windows on a house or imagining images).

The episodic buffer is dedicated to linking information across domains to form integrated units of visual, spatial, and verbal information and chronological ordering (e.g., the memory of a story or a movie scene). The episodic buffer is also assumed to have links to long-term memory and semantical meaning.

The working memory model explains many practical observations, such as why it is easier to do two different tasks (one verbal and one visual) than two similar tasks (e.g., two visual), and the aforementioned word-length effect. However, the concept of a central executive as noted here has been criticized as inadequate and vague.

Levels of processing

Craik and Lockhart (1972) proposed that it is the method and depth of processing that affects how an

experience is stored in memory, rather than rehearsal.

- **Organization** - Mandler (1967) gave participants a pack of word cards and asked them to sort them into any number of piles using any system of categorization they liked. When they were later asked to recall as many of the words as they could, those who used more categories remembered more words. This study suggested that the act of organizing information makes it more memorable.
- **Distinctiveness** - Eysenck and Eysenck (1980) asked participants to say words in a distinctive way, e.g. spell the words out loud. Such participants recalled the words better than those who simply read them off a list.
- **Effort** - Tyler *et al.* (1979) had participants solve a series of anagrams, some easy (FAHTER) and some difficult (HREFAT). The participants recalled the difficult anagrams better, presumably because they put more effort into them.

Classification by information type

Anderson (1976)[4] divides long-term memory into *declarative (explicit)* and *procedural (implicit)* memories.

Declarative memory requires conscious recall, in that some conscious process must call back the information. It is sometimes called *explicit memory*, since it consists of information that is explicitly stored and retrieved.

Declarative memory can be further sub-divided into semantic memory, which concerns facts taken independent of context; and episodic memory, which concerns information specific to a particular context, such as a time and place. Semantic memory allows the encoding of abstract knowledge about the world, such as "Paris is the capital of France". Episodic memory, on the other hand, is used for more personal memories, such as the sensations, emotions, and personal associations of a particular place or time. Autobiographical memory - memory for particular events within one's own life - is generally viewed as either equivalent to, or a subset of, episodic memory. Visual memory is part of memory preserving some characteristics of our senses pertaining to visual experience. One is able to place in memory information that resembles objects, places, animals or people in sort of a mental image. Visual memory can result in priming and it is assumed some kind of perceptual representational system underlies this phenomenon. [1]

In contrast, procedural memory (or *implicit memory*) is not based on the conscious recall of information, but on implicit learning. Procedural memory is primarily employed in learning motor skills and should be considered a subset of implicit memory. It is revealed when one does better in a given task due only to repetition - no new explicit memories have been formed, but one is unconsciously accessing aspects of those previous experiences. Procedural memory involved in motor learning depends on the cerebellum and basal ganglia.

So far, nobody has been able to successfully isolate the time dependence of these suggested memory structures.

Classification by temporal direction

A further major way to distinguish different memory functions is whether the content to be remembered

is in the past, retrospective memory, or whether the content is to be remembered in the future, prospective memory. Thus, retrospective memory as a category includes semantic memory and episodic/autobiographical memory. In contrast, prospective memory is memory for future intentions, or *remembering to remember* (Winograd, 1988). Prospective memory can be further broken down into event- and time-based prospective remembering. Time-based prospective memories are triggered by a time-cue, such as going to the doctor (action) at 4pm (cue). Event-based prospective memories are intentions triggered by cues, such as remembering to post a letter (action) after seeing a mailbox (cue). Cues do not need to be related to the action (as the mailbox example is), and lists, sticky-notes, knotted handkerchiefs, or string around the finger are all examples of cues that are produced by people as a strategy to enhance prospective memory.

Physiology

Overall, the mechanisms of memory are not completely understood. Brain areas such as the hippocampus, the amygdala, the striatum, or the mammillary bodies are thought to be involved in specific types of memory. For example, the hippocampus is believed to be involved in spatial learning and declarative learning, while the amygdala is thought to be involved in emotional memory. Damage to certain areas in patients and animal models and subsequent memory deficits is a primary source of information. However, rather than implicating a specific area, it could be that damage to adjacent areas, or to a pathway traveling through the area is actually responsible for the observed deficit. Further, it is not sufficient to describe memory, and its counterpart, learning, as solely dependent on specific brain regions. Learning and memory are attributed to changes in neuronal synapses, thought to be mediated by long-term potentiation and long-term depression.

Hebb distinguished between short-term and long-term memory. He postulated that any memory that stayed in short-term storage for a long enough time would be consolidated into a long-term memory. Later research showed this to be false. Research has shown that direct injections of cortisol or epinephrine help the storage of recent experiences. This is also true for stimulation of the amygdala. This proves that excitement enhances memory by the stimulation of hormones that affect the amygdala. Excessive or prolonged stress (with prolonged cortisol) may hurt memory storage. Patients with amygdalar damage are no more likely to remember emotionally charged words than nonemotionally charged ones. The hippocampus is important for explicit memory. The hippocampus is also important for memory consolidation. The hippocampus receives input from different parts of the cortex and sends it's output out to different parts of the brain also. The input comes from secondary and tertiary sensory areas that have processed the information a lot already. Hippocampal damage may also cause memory loss and problems with memory storage [5]

Disorders

Much of the current knowledge of memory has come from studying memory disorders. Loss of memory is known as amnesia. There are many sorts of amnesia, and by studying their different forms, it has become possible to observe apparent defects in individual sub-systems of the brain's memory systems, and thus hypothesize their function in the normally working brain. Other neurological disorders such as Alzheimer's disease can also affect memory and cognition. Hyperthymesia, or hyperthymesic syndrome, is a disorder which affects an individual's autobiographical memory, essentially meaning that they cannot forget small details that otherwise would not be stored.[6]

While not a disorder, a common *temporary* failure of word retrieval from memory is the tip-of-the-tongue phenomenon. Sufferers of Nominal Aphasia (also called Anomia), however, do experience the Tip of the Tongue phenomenon on an ongoing basis due to damage to the frontal and parietal lobes of the brain.

Impaired memory can be a symptom of hypothyroidism.

Memorization

Memorization is a method of learning that allows an individual to recall information verbatim. Rote learning is the method most often used. Methods of memorizing things have been the subject of much discussion over the years with some writers, such as Cosmos Rossellius using visual alphabets. The spacing effect shows that an individual is more likely to remember a list of items when rehearsal is spaced over an extended period of time. In contrast to this is cramming which is intensive memorization in a short period of time. Also relevant is the Zeigarnik effect which states that people remember uncompleted or interrupted tasks better than completed ones.

In March 2007 German researchers found they could use odors to re-activate new memories in the brains of people while they slept and the volunteers remembered better later.[7]

Tony Noice, an actor, director, teacher and cognitive researcher, and his psychologist wife Helga, have studied how actors remember lines and found that their techniques can be useful to non-actors as well.[8]

At the Center for Cognitive Science at The Ohio State University, researchers have found that memory accuracy of adults is hurt by the fact that they know more than children and tend to apply this knowledge when learning new information. The findings appeared in the August 2004 edition of the journal Psychological Science.

Improving memory

The best way to improve memory seems to be to increase the supply of oxygen to the brain, which may be accomplished with aerobic exercises; walking for three hours each week suffices, as does swimming or bicycle riding.[9]

Such aerobic exercises have helped elderly people switch between mental tasks, concentrate better, and improve short-term memory. Exercise increases the number of connections between neurons, which is responsible for improved memory.

The International Longevity Center [2] released in 2001 a report [3] which includes in pages 14-16 recommendations for keeping the mind in good functionality until advanced age. Some of the recommendations are to stay intellectually active through learning, training or reading, to keep physically active so to promote blood irrigation to the brain, to socialize, to reduce stress, to keep sleep time regular, to avoid depression or emotional instability and to observe good nutrition.

Memory Tasks

- **Paired Associate Learning** - when one learns to associate one specific word with another. For example when given a word such as "safe" one must learn to say another specific word, such as green. This is stimulus and response.[10]
- **Free Recall**- during this task a subject would be asked to study a list of words and then sometime later they will be asked to recall or write down as many words that they can remember.[11]
- **Recognition**- subjects are asked to remember a list of words or pictures, after which point they are asked to identify the previously presented words or pictures from among a list of alternatives that were not presented in the original list.[12]

Cultural references

- Marcel Proust's novels deal extensively with memory.
- The independent film *Memento* emulates the experience anterograde amnesia (that is, of not being able to convert short-term memories into long-term memories).
- In 1993 taxi driver Tom Morton, who knew over 16,000 telephone numbers in Lancashire, beat the British Olympia Telephone Exchange computer with his recall while being interviewed by Esther Rantzan and Adrain Mills on the Popular BBC magazine Programme *That's Life!*. [4]
- The short stories of Philip K. Dick and the movies based on those works deal extensively with the nature of memory and the consequences to society if memories can be artificially generated.
- *Strange Days* is a film about memory. New technology allows people to record all the sensory data associated with their experiences. Playing back one of these recordings is like exactly reliving moments. Lenny, the character played by Ralph Fiennes, has a storyline revolving around memories.
- *Eternal Sunshine of the Spotless Mind* is a film that deals with the meanings of love and memory when main character Joel gets the memories of his ex-girlfriend Clementine erased by fictitious company Lacuna.
- "Funes el memorioso" is a short story by Argentinian writer Jorge Luis Borges. It tells the story of Funes, who remembers every tiny detail of everything he observes or thinks and is unable to forget anything.

See also

- Memory and aging
- Autobiographical memory
- Cellular memory
- Cultural memory
- Eidetic memory
- Emotion and memory
- Episodic memory
- False memory
- Forgetting curve
- Genetic memory
- Involuntary memory
- List of memory biases
- Memory inhibition
- Memory-prediction framework
- Method of loci
- Mnemonic
- Muscle memory
- Synaptic plasticity

Notes

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2. ^ Baddeley, A. D. (1966). The influence of acoustic and semantic similarity on long-term memory for word sequences. *Quart. J. exp. Psychol.*, 18, 302-9.
3. ^ Baddeley, A.D. (2000). The episodic buffer: a new component of working memory? *Trends in Cognitive Science*, 4, 417-23.
4. ^ Anderson, J.R. (1976). Language, Memory and Thought. Mahwah, NJ: Erlbaum.
5. ^ Kalat, J. W. (2001). *Biological psychology (7th ed.)*. Belmont, CA: Wadsworth Publishing.
6. ^ Forgetfulness is the Key to a Healthy Mind. New Scientist, February 16. 2008.
7. ^ Smell of Roses May Improve Memory. Reuters, March 12. 2007.
8. ^ Noice and Noice. (2006). What Studies of Actors and Acting Can Tell Us About Memory and Cognitive Functioning. *Current Directions in Psychological Science*, Volume 15, Number 1, February, pp. 14-18(5).
9. ^ How memory improves
10. ^ paired-associate learning - Britannica Online Encyclopedia
11. ^ memory :: Recall - Britannica Online Encyclopedia
12. ^ memory :: Recognition - Britannica Online Encyclopedia

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- Costa-Mattioli, Mauro. (2007). eIF2α Phosphorylation Bidirectionally Regulates the Switch from Short- to Long-Term Synaptic Plasticity and Memory. *Cell*, Vol 129, 195-206, 06 April.

External links

- Stanford Encyclopedia of Philosophy entry
- Memory-related resources from the National Institutes of Health.
- Scientific American Magazine (February 2005 Issue) Making Memories Stick
- Amnesia - An overview
- Aristotle's On Memory and Reminiscence
- The World Memory Sports Council Information about the World Memory Championships
- Learning & Memory - online, peer-reviewed journal with many free access articles
- WNYC - Radio Lab: Memory and Forgetting Show #304 Friday, June 08, 2007
- Memory, Encoding and Retrieval
- Learning disabilities and memory

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Categories: Memory | Neuropsychological assessment
Hidden categories: All articles with unsourced statements | Articles with unsourced statements since November 2007 | Articles with unsourced statements since August 2007
